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August 17, 1992

Ms. Cheryl Walker Smith
Senior Remedial Project Manager
United States Environmental Protection Agency
345 Courtland Street Northeast
Atlanta, Georgia 30365

Re: Addendum for Macroinvertebrate Sampling
Phase III Sampling and Analysis Plan
RI/FS for McIntosh Plant Site
Olin Chemicals
McIntosh, Alabama
WCC File 90B449C
Document Control Number WCC-314

Dear Ms. Smith:

On behalf of Mr. Jim Brown of Olin Chemicals, Woodward-Clyde Consultants (WCC) is submitting an addendum to the Phase III Sampling and Analysis Plan for the macroinvertebrate sampling. This addendum is in response to your request at the July 30, 1992 meeting at McIntosh.

The macroinvertebrate sampling is scheduled to begin on August 25, 1992. If your have any questions regarding this addendum, please contact Mr. Jim Brown at 615-336-4308.

Very truly yours,

William A. Beal

Dennis E. Reece

WAB:kdl
Attachment

cc: Mr. J.C. Brown
Ms. T. B. Odom
Mr. D. E. Cooper (2)
Mr. R. A. Pettigrew

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ADDENDUM

MACROINVERTEBRATE SAMPLING
PHASE III SAMPLING AND ANALYSIS PLAN

1.0 INTRODUCTION

A Phase III sampling and analysis Plan (SAP) was submitted to EPA on June 25, 1992. This plan outlined the procedures for sampling of SWMUs in Operable Unit 1 and collecting additional grab and core samples in Operable Unit 2. Since submittal of the Phase III SAP, an environmental evaluation technical memorandum (EETM) was submitted to EPA (July 15, 1992). The EETM presented the results of the biota sampling in Operable Unit 2 and provided recommendations for further sampling of macroinvertebrates. This addendum to the Phase III SAP describes the macroinvertebrate sampling that will be conducted as recommended in the EETM. The same procedures will be used for the planned macroinvertebrate sampling that were approved by EPA in the revised sampling and analysis plan submitted in October 1991. These procedures are included as attachments.

2.0 DATA QUALITY OBJECTIVES

The results of the macroinvertebrate sampling that was conducted in November 1991 indicated that the basin does not a support a particularly diverse benthic community. The objective of the macroinvertebrate sampling described in this addendum is to compare the basin macroinvertebrate data to data from a reference area to assess whether comparable environments along the lower Tombigbee River floodplain support "richer" macroinvertebrate communities. Since there may be seasonal variations in benthos diversity, three stations from the basin that were sampled in November 1991 will be sampled again for comparison to the reference samples.

Additional data quality objectives that are related to the macroinvertebrate data analysis are presented in Attachment 1.

3.0 SAMPLE LOCATION AND FREQUENCY

Three samples will be collected from the selected reference location and three samples will be collected from the basin at stations that were sampled in November 1991.

3.1 Reference Samples

Woodward-Clyde Consultants (WCC) conducted a review of aerial photographs and topographic maps for the approximate 55-mile reach of the Tombigbee River between the basin and the Coffeeville Dam. Potential suitable reference areas were identified from this review. These potential areas were then further investigated by flying over this stretch of the river in a single-engine airplane.

Based on the above activities, Hatchetigbee Lake was identified as an area that appeared to be most comparable to the basin. Hatchetigbee Lake is located at about river mile 107, approximately 45 miles upriver from the basin. Figure 1 shows the location of Hatchetigbee Lake.

A site visit of Hatchetigbee Lake was conducted on August 5, 1992. Similar to the basin, the lake is located within the Tombigbee River floodplain, adjacent to a bluff that extends about 30 to 50 feet above the floodplain. Also similar to the basin, Hatchetigbee Lake experiences annual flooding from the Tombigbee River.

Probably the most distinct difference between the basin and Hatchetigbee Lake is related to the annual flooding. Hatchetigbee Lake is situated at an elevation of approximately 25 feet mean sea level (msl), as compared to the basin, which is at about 3 feet msl. Consequently, the magnitude and duration of the flooding would be less for Hatchetigbee Lake than for the basin. The differences in the flooding will have to be considered when comparing the results of the basin samples to the reference samples.

Prior to sample collection, depth measurements will be taken across the lake, and Ekman grab samples will be collected to evaluate bottom sediment conditions. Samples will then be obtained from three locations with sediment conditions comparable to the

basin: near-shore, intermediate and the deepest location observed during the depth survey.

3.2 Basin Samples

Three samples will also be collected from the basin at station locations that were sampled during the November 1991 sampling. The locations of the three basin samples will be determined based on the information obtained during collection of the reference samples. Specifically, the following conditions will be considered in selection of the sample locations:

- Water depth
- Sediment type
- Presence of detrital material
- Presence of herbaceous, emergent vegetation
- Proximity to the Tombigbee River

After evaluating these parameters, the three basin sample locations will be selected in the field with concurrence from EPA or the EPA Oversight Contractor.

4.0 SAMPLING EQUIPMENT AND PROCEDURES

The sampling equipment and procedures are outlined in Attachment 2.

5.0 SAMPLE HANDLING

The sample handling procedures are outlined in Attachment 3.

ATTACHMENT 1

DATA QUALITY OBJECTIVES

The resultant data from the benthic macroinvertebrate identifications will be subjected to several measures to determine if differences exist among sampling sites. In addition to taxonomic lists of individual taxa and major groupings by replicate and by site, the data will be examined using CLUSTER, SIGTREE, and COMTRE index analyses. CLUSTER is a similarity index using the Bray-Curtis coefficient with unweighted average linkage and the distance linkage scale. This program groups the replicates according to both composition and abundance to determine their similarity. The data are then subjected to SIGTREE, which determines the significance within a cluster, indicating that level of branching which constitutes a significant grouping. An hypothesis is formulated to test statistically whether two clusters within the overall cluster analysis results are sufficiently alike that they represent the same community. The third method listed is COMTRE, which compares two clusterings (also called dendrograms or trees) to determine if they are related or if the clusterings are random. These clusterings can result from the benthic macroinvertebrate data, chemical/physical data, or any of the available measurements. For example, this method can test every possible combination of the resultant benthic tree with the resultant sediment chemistry tree to determine if the benthic tree can be related to the sediment chemistry tree.

If sufficient data are available to be compared with established classifications, a biotic index, such as the North Carolina Biotic Index or the Hilsenoff Biotic Index, will be used to detect differences among sampling stations. The degree of usefulness of such indices will be dependent upon the abundance and diversity of the benthic macroinvertebrates.

Other indices such as the EPT [percent Ephemeroptera, Plecoptera, and Trichoptera (mayflies, stoneflies, caddisflies) to the total]; percent dominance, or percent OAC (Oligochaetes, Air-breathers and Chironomidae) could be used if the taxa appearing in samples are appropriate to warrant these types of analyses.

Two sediment replicates will be taken along with each set of macroinvertebrate samples (three separate grabs in a given station) to determine particle sizes, thus helping to define/confirm comparable substrata. Results from the particle size analyses will be subjected to the SIGTREE analysis to determine if sediments from any sites are significantly different. If there is no significant difference between sediments at any site, this parameter can be eliminated as a variable in the benthic composition, abundance, and distribution analysis. If there is a difference, the results will be used to determine if sediment sizes contribute to the benthic composition, abundance, and distribution analysis. If there is a difference, the results will be used to determine if sediment sizes contribute to the benthic community structure. Additionally, one sediment sample from each macroinvertebrate location will be analyzed for Total Organic Carbon (TOC). A Hydrolab® will be used to measure pH, temperature, specific conductance, and dissolved oxygen of the water directly above the sample locations. Depth measurements will also be obtained.

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ATTACHMENT 2

SAMPLING EQUIPMENT AND PROCEDURES

Substrate-associated aquatic macroinvertebrates will be sampled from three locations in the basin and from three locations in Hatchetigbee Lake.

Equipment

The macroinvertebrate and sediment samples will be collected with a standard (6 x 6-inch) Ekman grab dredge. The samples will be sieved through a No. 60 U. S. Standard Testing Sieve (0.25-mm mesh). Water quality parameters (pH, temperature, specific conductance, dissolved oxygen and pH) will be obtained with a Hydrolab®.

Procedure

Water quality parameters (pH, specific conductance, temperature, and dissolved oxygen) will be obtained directly above the sediment prior to sample collection with a portable Hydrolab®. The instrument will be operated and calibrated in accordance with the manufacturers recommendations. Calibration is accomplished by immersing the sensors in standard solutions, waiting for stable readings and briefly interpreting the data printout to set new calibration points. Calibration will be conducted every time the instrument is connected to the computer or a minimum of once daily. Depth measurements will also be taken at each location.

One sediment sample will be collected at each macroinvertebrate sample location for TOC analysis. The sediment samples will be placed in 8-oz/250 ml amber, wide-mouth jars with teflon screw caps and immediately placed in coolers with ice. The sediment samples will be shipped to the laboratory in these coolers under established chain-of-custody procedures.

At each station, three 0.023-m^2 grab samples will be collected and processed separately. The contents of each grab will be rinsed and concentrated through a No. 60 U. S.

Standard Testing Sieve (0.25-mm mesh). Materials retained by the sieve will be transferred to an appropriate-sized, prelabeled container and preserved in 5 percent formalin for transport to the laboratory. The preservative will be buffered and will contain an animal tissue-specific stain (Phloxine-B) to facilitate later separation from extraneous material.

Based on observations made during Phase I, it appears that most, if not all, of the sediment particles collected in each Ekman grab will easily pass through the No. 60 sieve, leaving only macroinvertebrate animals and limited quantities of organic detritus. In the laboratory, each sample will be washed in a No. 60 sieve to remove any remaining fine sediment particles and the formalin. After the macroinvertebrates are stained and washed, they will be stored in 40 percent isopropyl alcohol if they are not processed immediately. Materials retained by the sieve will be examined under magnification and the macroinvertebrates will be separated from detrital material and sorted into major taxonomic categories (e.g., amphipods, insect orders, oligochaete worms). All specimens in each category will be counted, and up to the first 200 individuals will be identified to the lowest positive and practical taxonomic level, thus providing a basis for calculating overall numbers (by category) per unit of sampling effort and for summarizing the qualitative composition of each sample. By applying this technique to each of the three grabs from a station, the likelihood of failure to document the occurrence of any ecologically significant members of a category is very remote.

QA/QC practices for laboratory analyses of the benthic invertebrates are:

- After sorting, identification, and counting, 20 percent of the samples (i.e., 4 of the 18) will be redone by a qualified individual other than the person who performed the initial processing.

- Representative specimens for each of the taxa identified in 20 percent of the samples (i.e., 4 of the 18) will be submitted to outside taxonomic experts for verification of identifications.

- For any taxa where doubt exists as to the accurate identification, representative specimens will be sent to outside taxonomic experts.

- A voucher collection will be established of representative specimens of all taxa identified during the study.

Sample Designation

Sample identification will consist of sample type (macroinvertebrate, sediment) and grid location number and replicate number. For example, the first discrete macroinvertebrate sample obtained from a location F1 will be numbered M-F1/01. For the reference samples, the two letter location designation will be R followed by S, I or D for shoreline, intermediate and deep, respectively.

Labels will be used for sample security, identification, and integrity. Information on the sample container will include the following:

- WCC project number
- Sample station number
- Date and time of sample collection
- Type of sample (macroinvertebrate, sediment)
- The name(s) of the sampler(s)
- Whether the sample is preserved or unpreserved
- Any other relevant comments

Once this information has been put on the sample label and the sample label affixed to the jar, the label will be covered with clear vinyl tape to protect this information. The sample identification code will be used to identify each sample in the master field log book and other field documentation logs.

Field Documentation

Sampling activities will be documented in a bound field log book with consecutively numbered pages. Information recorded in the log book will include:

- WCC project name and number
- Location and sampling activity
- Purpose of sampling
- Number and approximate volume of samples taken
- Description of sampling point
- Date and time of collection
- Collector's sample identification number(s)
- Sample distribution (e. g., chemical laboratory, geotechnical laboratory, etc.)
- Sample preservation
- Field observations
- Any field measurements made, such as pH, specific conductivity or other field parameters
- Weather conditions

The documentation in the log book will be sufficient to reconstruct the sampling situation without relying on the collector's memory.

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ATTACHMENT 3

SAMPLE HANDLING

Sample Containment and Security

Samples will be stored in a manner that will not jeopardize the representativeness of the media sampled. For samples to be analyzed for chemical parameters (i.e., the TOC samples), this means storage in sample coolers (with ice). The macroinvertebrate samples will be preserved in formalin as described in Attachment 2 and placed in sample coolers (without ice).

Sample coolers will be under the direct observation of WCC personnel at all times or secured with custody seals to detect tampering. If samples are not attended, they will be kept in a secured facility. All samples will be turned over to the WCC field operations task leader or his designee at the end of the day, along with chain-of-custody forms and field documentation forms. The samples for TOC analysis will be placed in the coolers packed with ice or ice packs upon retrieval and will be maintained at approximately 4 °C until delivery to the laboratory. Prior to shipment, a second person (other than the one packing the cooler) will verify samples, chain-of-custody and other documentation.

Chain-of-Custody

The chain-of-custody procedures document sample possession from the time of collection to final disposition.

For the purpose of these procedures, a sample is considered in custody if it is:

- In one's actual possession
- In view, after being in physical possession
- Locked so that no one can tamper with it, after having been in physical custody

- In a secured area, restricted to authorized personnel.

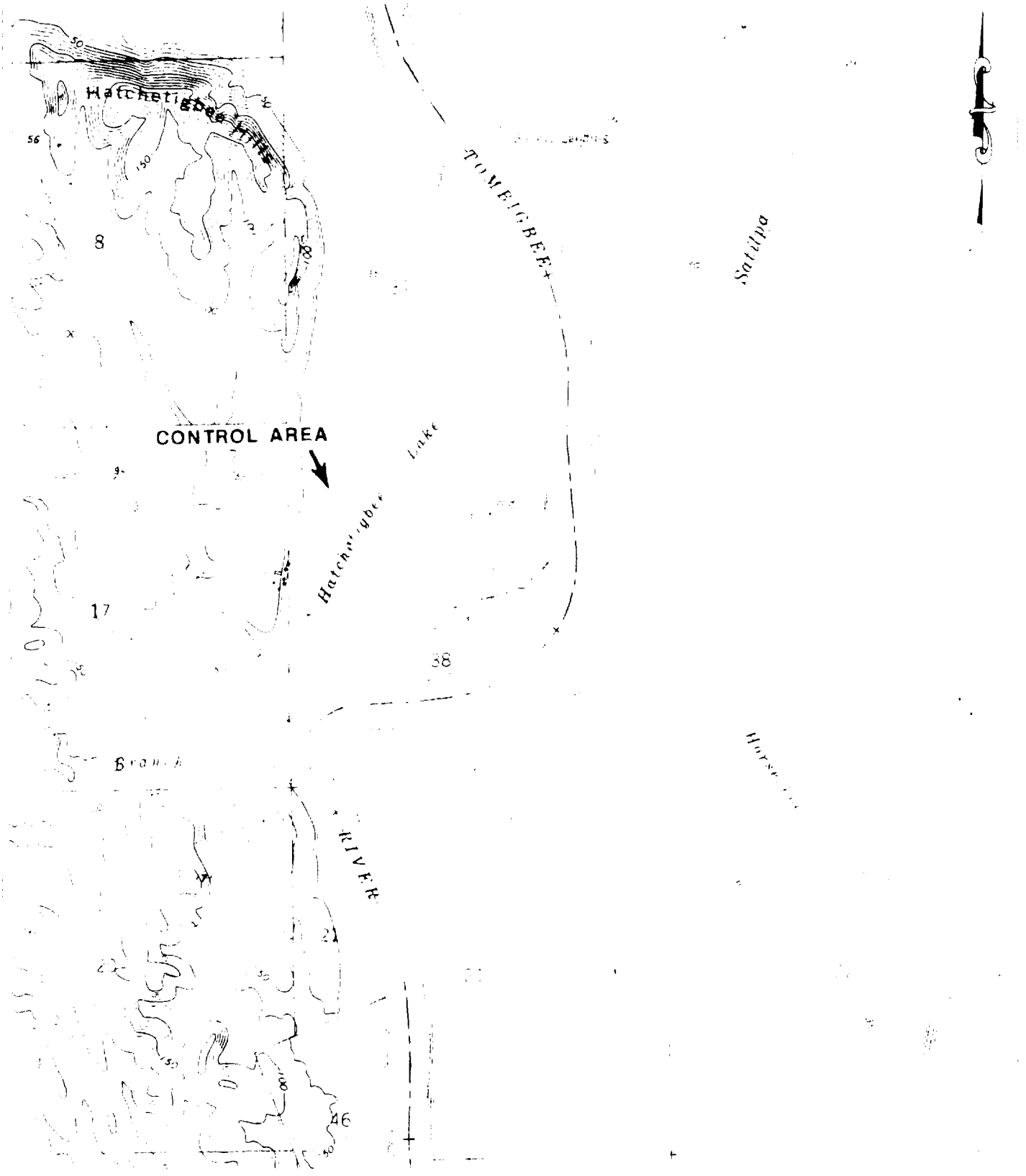
A chain-of-custody form will be initiated in the field, and the original will accompany the samples with copies retained at intermediate steps. The following information will be specified for each sample on the chain-of-custody form:

1. Sequential sample number
2. Sample date
3. Sample time
4. Sample location and depth where appropriate
5. Analyses to be performed

The chain-of-custody form will be signed by the sample custodian. It will be placed in a water-tight plastic bag and taped to the underside of the lid of the cooler containing the samples designated on the form. The lid of the cooler will be securely taped shut with custody seals, using evidence tape to allow detection of any possible tampering. Upon arrival in the laboratory, samples will be received by the analytical laboratory representative. Samples contained in the shipment will be compared to the chain-of-custody form to ensure that all samples designated have been received.

Each time responsibility for custody of the sample changes, the new custodian will sign the record and denote the date. An exception would be the commercial carrier, if used. A copy of the signed record will be made and retained by the immediately previous custodian and sent to the designated WCC personnel to allow tracking of sample possession. All changes of custody of samples must be a person-to-person change of physical possession.

Upon completion of the analysis, the custodian responsible for the analysis will complete the chain-of-custody record, file a copy, and send the original with results to the WCC Project Manager for record keeping.



REFERENCE: U.S.G.S. QUADRANGLE MAP "TATTLERSVILLE, ALA." DATED 1972, AND PHOTOINSPECTED 1981.

RI/FS
McINTOSH PLANT SITE

OIL CHEMICAL CORPORATION
CHARLESTON, TENNESSEE

Woodward-Clyde Consultants
Consulting Engineers, Geologists and Environmental Scientists
Baton Rouge, Louisiana

SCALE:	DRAWN BY: JB	DATE: 8/7/92
1:24,000	CHKD. BY: [illegible]	DATE: 8/7/92

MACROINVERTEBRATE CONTROL AREA

FILE NO. 90B449C

FIG. NO. 1